ABSTRACT OF THE DISCLOSURE

A seismic isolation bearing comprises a lower plate, an upper plate, and a cylindrical roller in rolling contact with an upwardly facing bearing surface of the lower plate and a downwardly facing surface of the upper plate. The lower plate is fixable to a base, while the upper plate is fixable to a superstructure, for example a bridge deck. One or both bearing surfaces are sloped to form a central trough at which the cylindrical roller resides under normal weight of the superstructure, and toward which the roller is biased when relative displacement between the lower and upper plates occurs to provide a constant restoring force. A pair of sidewall members are fixed to the lower plate to withstand strong forces directed laterally with respect to the isolation axis along which rolling displacement occurs, and a pair of sliding guides carried one at each end of the roller provide dry frictional damping as they engage an inner wall surface of a corresponding sidewall member. The isolation bearing preferably comprises a locking mechanism that prevents relative displacement under normal non-seismic horizontal loading, but allows the bearing to function as intended under seismic loading. Visco-elastic or viscous dampers, linear springs, and nonlinear springs such as hardening springs are preferably mounted between the lower and upper plates to reduce bearing displacement, dissipate energy, and otherwise adjust periodic motion characteristics of the bearing. Further embodiments providing isolation along orthogonal X and Y axes, as well as guidance mechanisms for maitaining roller alignment, are also disclosed.